



GLAST Monthly PSR

Safety and Mission Assurance

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Accomplishments



- ▶ ***Manufacturing and Quality Reviews***
- ▶ The SAM visited Teledyne to discuss in-plant QA representation during flight electronics fabrication. The SLAC Statement of Work (SOW) will be reworded to satisfy all parties.
- ▶ The SAM attended the Manufacturing Readiness Review (MRR) for the Calorimeter carbon fiber structure (detector bar housing). The new process utilizes an autoclave which had been characterized on 3 previous runs. 1 RFA (minor) was given to the team which addressed the 1 year life of the prepreg material and the planned manufacturing cycle.



Accomplishments



► **Software**

- Attended the GBM IOC CDR and the GSSC design review.
- Reviewed the latest spacecraft flight software metrics package. No measurements warrant concern.
- The risk management process for the ground system is now being implemented.
- Dave Harmon, Software QE, accompanied Spectrum Astro's Software QE on an audit of their flight software development processes. There was one minor finding which was concerned with how unit-testing results are being documented.



Accomplishments



► ***Safety***

- **Working with Spectrum Astro Launch Vehicle Interface Manager to complete changes to the PHA and submit to the Range.**
- **The Orbital Debris Report has been completed and is being submitted for review.**
- **Participated in initial Mission Integration and Ground Operation Working Groups (MIWG/GOWG) at Cape Canaveral AFS and Astro Tech.**



Issues/Problems



- The GLAST project needs to determine if they will be sending telemetry on the pad and during ascent.
- Need qualification and historical data from LM on heat pipe welds to be able to justify forgoing weld x-rays.
- Possible lifting of the Observatory using lifting points below the center of gravity (CG). (Awaiting completion of structural analysis from code 543 and the Stanford Linear Accelerator Center)



Accomplishments

► *Reliability*

- *Completed a risk assessment associated with the new GPS receiver antenna design being proposed for GLAST. Included in the assessment are impact and likelihood analysis along with recommendations for risk mitigation. The project is currently evaluating their options.*
- *Completed a risk assessment associated with the use of palladium wiper Betatronix potentiometers for GLAST. These parts were to be used in the solar array and Ku band drive assemblies. Based on information provided, Spectrum Astro is proactively changing from the palladium wiper to gold wiper version. A NASA advisory is still pending, which is being addressed separately by Codes 563 and 306.*
- *Placed the preliminary LAT Probabilistic Risk Assessment report, with new TEM power supply information, on the SLAC website for review.*



Issues/Problems

► *Reliability*

- *Preliminary spacecraft PRU FMEA indicates that there are potential failure event sequences that could pose over-voltage hazards to the LAT instrument. NASA and Spectrum Astro reliability, power, and systems engineers are actively addressing this concern.*
- *Current spacecraft PRU DC-to-DC Converter reliability estimates are lower than allocated targets needed to meet mission lifetime requirements. However, current estimates are based on conservative methodology. With the same family of converters currently in use on the International Space Station, NASA and Spectrum Astro are working together to increase the fidelity of reliability estimates based on actual flight data and/or modify the PRU design to insure reliability risks are minimized.*
- *Need to insure that Boeing, the launch vehicle provider, is fully aware of their responsibilities to prevent helium contamination to the spacecraft and instruments.*
- *The Final LAT FMEA report needs to be placed on the SLAC website.*



Upcoming Events



► *Reliability*

- *Assist SLAC in finalizing the LAT FMEA report.*
- *Complete analysis and mitigation plans for the spacecraft-to-LAT over voltage risks and associated spacecraft PRU reliability estimates.*
- *Hold meeting with the Launch Integration Manager to insure necessary helium contamination controls are in place.*
- *Work with Erik Andrews and Joe Callender to have the spacecraft PRA cover memory errors or boot errors that could potentially cause the solar array to not point at the Sun.*
- *Work with the mission operations team to incorporate credible event sequences into the mission PRA.*



Accomplishments

► *Parts & Materials*

- Sponsored weekly radiation telecons between SLAC, NRL, ACD, Code 561 and Code 562 and issued the meeting minutes for each. (No change)
- Participated in Parts Control Board (PCB) meetings for the various GLAST subsystems. (No change)
- The fifth HV ceramic capacitor part number procured from CalRamic has passed DPA. All parts from this new supplier are now ready for approval by the Parts Control Board (PCB).
- Numerous GLAST parts have been submitted to the Code 562 T&A laboratory for either screening or DPA, including connectors, capacitors, transistors, diodes, and microcircuits. Presently, the laboratory is gearing up for the pending screening and qualification testing of the ACD GARC and GAFE ASICs.



Accomplishments



► *Parts & Materials (Continuing)*

- Fixturing for shock/vibration testing, the final step in qualification inspection of the Omnetics nano type connectors, is nearing completion. If shock/vibration testing is successful, these connectors will be considered acceptable for flight use.
- Updated GSFC S-311-320-LATACD-0004 to Revision A to incorporate changes to the specified core epoxy mix. This specification is for the filter inductor used on the ACD FREE board.
- Prepared a new GSFC specification (S-311-641/02, Thermostatic, Bemetalllic, SPST, Narrow Differential, Hermetic) for the Control Products (Texas Instruments) M2 series that SLAC Mechanical Systems is planning to use on the LAT Thermal Control System (TCS). The new specification is available on the NASA NEPP website (<http://nepp.nasa.gov>) in the Procurement and Screening Specifications section.



Issues/Problems

► *Parts & Materials*

- MAX145 ADCs and MAX5121 DACs were susceptible to numerous Single Event Upsets (SEUs) and Single Event Functional Interrupts (SEFIs) during the recent radiation testing performed at Texas A&M (TAMU). These results contradict earlier testing performed at Brookhaven by NRL. Test data and setups are being analyzed to determine the reason for these unexpected results. This matter is serious because these parts have been designed into almost all of the LAT subsystems.
- Anomalies have been noted during qualification testing of PCI (pressfit) connectors, both ValConn and AMP. These test anomalies may or may not be parts issues. This is being closely watched by GLAST since PCI connectors will be used in both the LAT instrument and the spacecraft. (No change)



Accomplishments



► ***QE Resident at SLAC***

- **Conducted a Quality Site Survey at Teledyne Microelectronics. Survey entailed Document and Process and workmanship review.**
- **Conducted a facility survey at Tapemation in Scotts Valley, Ca. Tapemation is performing the final machining on the Mechanical Grid Billet material.**
- **Conducted a Facility survey at Bodycote in Westminster, Ca. Bodycote performed the flatness & annealing process on the Flight Grid material.**
- **SLAC management has added additional QA employees to Darren Marsh staff. Both have previous flight hardware experience with Lockheed.**



Issues/Problems

► ***QE Resident at SLAC***

- Receiving inspection of Drop shipped parts at Teledyne electronics is not being performed. SLAC has taken an action to retroactively perform inspection on all previous and future shipments.
- Omnetics connectors have yet to be qualified for flight. The decision has been made, to use these connectors (at risk) while waiting for the completion of Goddard's Qualification test's.



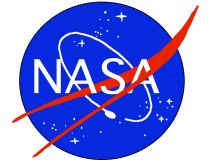
Upcoming Events

► ***QE Resident at SLAC***

- **Production Readiness Review to be held at Teledyne Microelectronics in Jan 04.**
- **Manufacturing Readiness Review to be held at Lockheed Martin on Dec 16, 03 for the Radiator and Heath Pipe fabrication.**
- **Manufacturing Readiness Review to be conducted at Teledyne prior to fabrication of Flight MCM assemblies.**



Accomplishments



► ***QE Resident at Spectrum***

- ***Resident QAE continued reviewing plans, and procedures in addition to any Material Review Board (MRB), and or Failure Review Board (FRB) actions.***
- ***Bryce Brandstatter and Joe Callender have been named as the new Spectrum Astro parts and reliability engineers respectively, replacing Mark Porter who previously held both assignments.***



Issues/Problems

► *QE Resident at Spectrum*

- There were two star tracker failure at Goodrich during vibration test. Spectrum Astro is discussing sending a team to Goodrich to work on identifying the root cause of these failures. The decision will be made on the week of 12/5. The preliminary information seem to indicate that the cause of the failure of Tracker S/N1003 was that the BAE static RAM chip was not bonded onto the board prior to soldering the leads. Further investigation revealed that about 25% of the chips on the board were also not bonded. A look at other boards from the same lot showed 11 other boards that had the same problem. It seems to be a process problem that will be follow-up by the GSFC resident QE at Spectrum. The root cause of the second Tracker failing functional testing at X-Axis vibe is still unknown and will be reported when it becomes available.



Anticoincidence Detector (ACD)



- Attended Photomultiplier tube (PMT) materials and processes reviews at GSFC. Revised the fab and flow of manufacturing to facilitate QA inspection capability.
- Added QAE to the ACD effort for the next few months.
- Procedures, plans and drawings are being reviewed and comments provided.
- SMA personnel are confirming that ACD Helium Contamination requirements are well understood by Boeing, the launch vehicle provider; and that necessary preventative measures are being taken.